**Individual Report**

Thin client network for a small school using an “ultra” thin client

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## Explain how sustainability can be integrated into your individual Project

Using ultra thin client will lengthen product life cycles and increase material sustainability. In an ultra thin client solution, as the central server completes all of the work, the hardware in a thin client does not need to have a high specification. Therefore new operating systems may come and go but the hardware in the thin client will not need to change.

Using Low‐energy hardware makes energy savings to the school. Increase server utilization and find Low‐energy storage hardware to help reduce the power usage.

**About Ultra thin client**

Thin clients are desktop appliances or network devices that link the keyboard, monitor, and mouse to a server where all applications and data are stored, maintained, and processed.

Since all network and computer services are centralized, all maintenance and upgrading is done at the server; there is no need to service the clients

**YW Ultra Thin Client terminal Y210**

**ITEM NO**.      Y210 Thin Client

              

Internal HW 1GHz arm11 CPU, 128M bytes DDR2 400, 128M bytes Nand Flash, Embedded WinCE6.0 operating firmware,Embedded 802.11N WiFI Adapter.

**DESCRIPTION**     Y210 uses 1GHz arm11 CPU, 128M bytes DDR2 400, 128M bytes Nand Flash, It embeded WinCE6.0 system.Embedded 802.11N WiFI Adapter. It Use RDP6.0 protocol, It can support Windows xp, Vista, Windows 7, Windows 2003, Windows 2008/2010, Fedora Linux, Ubuntu Linux, supports Citrix ICA protocol,tested working on citrix xendesktop and citrix xenApp..

**HARDWARE**

Size Width:  168 mm/6.6 inches, Height:  29 mm/1.1 inches, Depth: 129 mm/5.1 inches

Weight    Y210 Access Terminal:  240 g / 0.53 lbs

**Power Supply**

Input:  100-250 VAC, 50-60 Hz

Output:  5 VDC, 2 A

Nominal consumption: 5 W"

**Front LED Indicators**

Power:   connection to power supply

LAN:      connection to network

Ready:   connection to host PC

**Connection to Host PC**       Unlimited distance via 100 Mb/s switched Ethernet connection

The thin client can work with both Static IP and Dynamic IP,can be used stand-alone;firmware supports remote update.

Video Resolution

(4:3)  : 800x600, 1024x768,1280x1024,1600x1200;

(16:9) : 1280x720,1366x768,1600x900,1920x1080;

(16:10): 1440x900,1650x1080;

Color Depth: 16/24/32-bit color

Audio out     16-bit stereo output via speaker port

Audio  in       16-bit stereo input via Micphone port

**USB Flash Memory Port**     USB2.0 x 3, To support USB memory devices-requires Windows OS on host

With WIFI function,support WEP,WPA,WPA2...many kinds of encryption modes.

With one RS232 serial port,can connect RS232 peripherals.

Reliability (MTBF)       >100,000 hours (calculated using Bellcore Issue 6 TR-332, Case 2, Part I at 40 degree)

Benefits

☺Lower Noise  
☺Easier to maintain  
☺Enhanced Data Security  
☺Lower Hardware Costs  
☺Less Network Bandwidth

☺Less Wasted Hardware  
☺Lower IT maintain Costs  
☺Simple Hardware Update

☺Easier Hardware Failure Management  
☺More Efficient Use of Computing Resources  
☺Less Energy Consumption (under 5 watts per user)

Suitable and especially for: Office, call center, training center, factory, school, coffee, government, library,Hospital,Family,Hotel etc.

**SYSTEM REQUIREMENTS AND OPTIONS**  
Host PC Configuration: We advise you to configure the server according to following standard: 250M MHz CPU and 256M RAM per terminal/each user;  
\*Note: the maximum number of users varies depending on the number of processor cores, the amount of memory, the type of hard drive on the host computer and  
administrative privileges.

**Kit Contents**Y210 Kit includes access terminal, power supply/cord, software installation & user guide CD and monitor mounting bracket.

PC, monitor, USB keyboard, USB mouse, speakers and other peripherals are NOT included and must be purchased separately.

You can use the VESA mounting bracket

## Research and identify suitable technology solutions applicable to the project

**Citrix ICA protocol** is a client-server protocol that allows a client device to connect to a Citrix WinFrame or Metaframe server. It also permits a variety of operating systems servers (eg Unix, or Novell) to access and run Windows applications.

**Microsoft RDP protocol** is a client-server protocol that allows a client device to connect to a Microsoft Terminal Server.

The dominance of Windows as an operating system and Citrix as server software has meant that other server software and applications have tended to conform to one of these two protocols. The emergence of Microsoft’s Windows Server 2003 has meant that Citrix software is no longer required to run Windows applications on non Windows network devices.

## Explain the power consumption data compared to benchmarks

Ultra thin client use significantly less power.

The tests measured power draw at the following stages:

OFF

MAX BOOT

IDLE

Wordprocessing

Spreadsheets

Savings achievable by replacing desktop computers with ultra thin clients

Replace 20 desktop computers with 20 ultra thin clients

Time in On mode: 2400 hrs (24\*5\*20)

Time on Off mode: 960 hrs

Efficient ultra thin client: 7watts on and 2watts off

A PC will typically use around 60-100 watts when in use, compared to 8-15 watts for thin-clients.

To figure out how much that comes to on a yearly basis, perform the following calculation for each type of client computer in the network:

n\*p\*h\*52 = the number of kWh your client computers use each year where:

*n* is the number of desktop devices

*p* is the power (in kilowatts) used by each device

*h* is the number of hours each week that the devices are turned on

52 is the number of weeks in a year

Ultra thin client: 20\*7/1000\*2400\*52 = 17472

Desktop PC: 20\*69/1000\*2400\*52 = 172224

Cost saving is 154752

|  |  |
| --- | --- |
| **Hardware** | **Average power**  **E.g. browser open** |
| Server | 45 watts idle |
| Switch 24 Port TP Link TL1024d GigaBit | Idle 7 -8 watts (2 thin clients attached) |
| Thin Client x 20  Wyse SE3215 | 9 watts (each) |
| Modem/router | 6 watts + 1watt for dongle |
| Printer Lexmark Z12 | Idle 8 -16 watts |
| Monitor hp compact FP5315 x 2 | 18 watts (each) |
| Thin Client x 20  Ultra Thin Y210 | 7 watts (each) |
| TOTAL | 152 watts (Server + 2 thin clients + 3 monitors+ printer)  COST $0.86 per day |
| TOTAL (estimated) | 1000 Watts (Server & 20 thin clients) |

## Advise how sustainable management principles may be applied to your individual project resulting in reduced environmental impact

Using ultra thin client will lengthen product life cycles and increase material sustainability. In an ultra thin client solution, as the central server completes all of the work, the hardware in a thin client does not need to have a high specification. Therefore new operating systems may come and go but the hardware in the thin client will not need to change.

Less energy means less CO2 produced. Longer useful life and fewer computers used means less waste entering landfill sites. Less heat means less air-conditioning requirements

## Provide key performance indicators (KPI) - sustainability performance for your individual Project

**Key Performance Indicators**

|  |  |  |  |
| --- | --- | --- | --- |
| **Hardware** | **SD-KPI 1: Energy / greenhouse gas efficiency of production / products in use**  **(tons CO2)** | **SD-KPI 2: Proportion of products with “Design for Environment” / Eco-Label**  **(√)**  **or (x)** | **SD-KPI 3: Emissions of (hazardous) waste and toxic materials**  **Yes or No** |
| Server | .045 x 24 x 365 x6.89560/10000 = 0.271824552 | Generic server used hence NO | Generic server used hence NO |
| Switch 24 Port | 0.008x24x365 x6.89560/10000=0.048324 | Power consumption automated based on length of power lead and cables connected.  Reference from tp-link.com/lk/products | ROHS = yes |
| Thin Client x 20 | 0.009x7x262 x6.89560/10000=0.011381(per monitor)  Total = 0.227637 (for 20 ) | WYSE WT3125SE model = NO logo  Ultra thin client Y210 = NO logo | Y210 ROHS = yes  WYSE WT3125SE = NO |
| Modem/router | 0.007x24x365 x6.89560/10000=0.042283 | Netgear green logo refer to website. | No |
| Printer | 0.016x24x365 x6.89560/10000= 0.096648 | Yes = EPA Energy Star symbol (on the box) | No |
| Monitor | 0.018x7x262 x6.89560/10000=0.022763 (per monitor) | Yes = EPA Energy Star symbol (on the box) | NO |

## Advise what actions could improve the KPI’s for your Individual Project which foster sustainability and environmental best practice

* School adopting green practice in everyday use of IT
* Increase the use of server-hosting services and reduce the number of inefficient server rooms scattered throughout school
* Increase the use of thin client computing
* Promote the communication and collaboration technologies which allow home working and reduce un-needed travel
* Awareness Raising, Training and Communication - Environmental issues to be discussed at school meetings

## Evaluate the estimated CO2 emissions with comparable benchmarks; and

## Estimate the carbon dioxide (CO2) emissions for the Individual Project; and Individual Project + Recommended Actions

|  |  |  |  |
| --- | --- | --- | --- |
| **Hardware** | **Benchmark**  **(tons CO2)** | **Individual Project**  **(tons CO2)** | **Individual Project**  **+**  **Recommended Actions**  **(tons CO2)** |
| Server | 0.271824552 | 0.271824552 | Switch off the server on weekend |
| Switch 24 Port | 0.048324 | 0.048324 | Switch off on weekend and classes non operating hours |
| Thin Client x 20 | 0.227637 (for 20 ) | 0.227637 (for 20 ) | Switch off on weekend and classes non operating hours |
| Modem/router | 0.042283 | 0.042283 | Switch off on weekend |
| Printer | 0.096648 | 0.096648 | Switch off on weekend and classes non operating hours and put on sleep for non working hours |
| Monitor | 0.022763 | 0.022763 | Switch off on weekend and classes non operating hours and put on sleep for non working hours |

## Make recommendations in order of priority and give estimates of implementation costs on integration of sustainability for other ICT projects; and

## Estimate potential energy savings and payback periods for recommended actions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Recommendation** | **Priority** | **Implementation Cost** | **Energy Saving** | **Payback Period** |
| LCD Monitor | 3 | $1,253 | 55%-60% energy reduction compared to CRT monitor | 3 months |
| Note book PC | 4 | $1,975 | 85% energy reduction compared to desktop systems | 3 months |
| Ink jet printer | 2 | n/a | 40%-80% energy reduction compared to laser jet printer | 6 months |
| Low power desktops | 1 | $1,125 | 20%-60% energy reduction compared to standard desktop | 10 months |